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LEARNING DISABILITY--A FAMILIAL STUDY.

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TO AID IN THE DEVELOPMENT OF APPROPRIATE REMEDIAL MEASURES, A STUDY OF EDUCATIONALLY HANDICAPPED STUDENTS WAS CONDUCTED IN A PALO ALTO, CALIFORNIA, MIDDLE-CLASS SCHOOL DISTRICT WITH A SAMPLE OF 304 ELEMENTARY AND JUNIOR HIGH SCHOOL STUDENTS. THE TWO IMMEDIATE PURPOSES OF THE STUDY WERE--(1) TO DISCOVER HOW TO IDENTIFY, DESCRIBE, AND LABEL MORE PRECISELY THE CHARACTERISTICS OF EDUCATIONALLY HANDICAPPED CHILDREN, AND (2) TO FURTHER CLARIFY THE CAUSES OF LEARNING DISABILITIES. FIRST EDUCATIONALLY HANDICAPPED CHILDREN AND THEIR SAME SEX SIBLINGS WERE MATCHED WITH ACADEMICALLY SUCCESSFUL CHILDREN AND THEIR SAME SEX SIBLINGS. THE CHILD'S ORDINAL POSITION WITHIN THE FAMILY WAS NOT FOUND TO BE SIGNIFICANTLY RELATED TO HIS LEARNING DISABILITY. THEN TO EXPLORE OTHER FAMILIAL ASPECTS OF POOR LEARNING ABILITY, THE PARENTS OF THE CHILDREN IN BOTH GROUPS WERE COMPARED. IT WAS FOUND THAT THE SOCIOECONOMIC AND EDUCATIONAL BACKGROUNDS OF THE PARENTS DID NOT DIFFER MARKEDLY. HOWEVER THE PARENTS OF THE ACADEMICALLY SUCCESSFUL GROUP DID BETTER ON HIGH SCHOOL READING TESTS ADMINISTERED AS PART OF THE STUDY THAN DID THE PARENTS OF THE EDUCATIONALLY HANDICAPPED CHILDREN. THEY ALSO HAD RECEIVED HIGHER GRADES IN HIGH SCHOOL ENGLISH AND LANGUAGE ARTS COURSES. IN MATHEMATICS THERE WERE NO SIGNIFICANT DIFFERENCES BETWEEN THE FATHERS IN THE TWO GROUPS ALTHOUGH THE MOTHERS OF THE ACADEMICALLY SUCCESSFUL GROUP HAD RECEIVED HIGHER HIGH SCHOOL GRADES THAN DID THE MOTHERS IN THE HANDICAP GROUP. A SECOND PHASE OF THE STUDY WILL BE COMPLETED AND REPORTED LATER. THIS PAPER WAS PREPARED FOR PRESENTATION AT THE SRCD MEETINGS IN NEW YORK, MARCH 31, 1967. (DK)

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Learning Disability - A Familial Study

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In 1896 a British school physician observed that there were otherwise intelligent children who had great difficulty learning to read. A few months later a second British physician (Morgan 1896) published a case study in the British Medical Journal entitled "A case of congenital word-blindness". (The term "word-blindness", incidentally, is still in common use in Europe.) He described the considerable difficulties in reading and writing displayed by an intelligent 14 year old boy. This boy confused the sequential order of the letters in his own name, made other bizarre spelling errors, and as a young child had had great difficulty learning the letters of the alphabet. He was, however, reported to be good at mathematics.

The first extensive description of "word-blindness" was made by Henshelwood in a monograph in 1917. He presented detailed descriptions of symptoms, and observed that "word-blindness" is familial.

Throughout the years various authors have continued to mention heredity as an important etiological factor in learning disabilities. Hallgren (1950) published the results of his genetic studies in Sweden, under the title "Specific Dyslexia" with the sub-heading (Congenital Word-Blindness), in which he explored the familial incidence and clinical symptoms of dyslexic children. He studied 276 cases of specific dyslexia, 116 affected children and 160 secondary cases (siblings and parents of the affected). Time does not permit a complete review of his study; his familial data, however, are impressive. He concluded that he had established the genetic transmission of this abnormality. These conclusions, however, have been challenged for two reasons. First, the data on his secondary cases were for the most part from retrospective interviews. The reliability of retrospective information is being questioned today (Robbins 1963). In addition, interview responses to questions about the incidence of family learning problems may be especially vulnerable to distortion: for example, a father may assert that the learning problems

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are in his wife's family; or a parent's own early learning problems may be repressed. The second reason for questioning Hallgren's conclusions is related to his interpretation of the data. Familial incidence of a given behavior does not necessarily mean that the abnormality is genetically transmitted. The interpersonal relationships and subsequent social learning within a family may be called upon to explain common patterns of behavior.

A different approach to the study of genetic etiology is available through twin studies. It is common knowledge that there are two kinds of twins - monozygotic (identical genetically) and dizygotic (genetic similarity as found in non-twin siblings). If it is possible to demonstrate that monozygotic twins have the same abnormality far more frequently than do dizygotic twins, we may assume that heredity plays a more important role in the abnormality than does the environment. Hallgren, whose work was mentioned earlier, and Norrie (1954) have both published data on twin studies. The findings of these twin studies are reported in Table I. Examination of the table indicates that in the three pairs of Hallgren's identical twins there was concordance; but there was concordance in only one of his three pairs of fraternal twins. Norrie reported concordance in all nine identical twin pairs; but in only 10 of the 30 fraternal twins. Since all of the monozygotic twins in these studies showed concordance, we may speculate that heredity is a critical etiological factor in certain types of learning disorders.

Research to date leaves many unanswered questions. No investigator, to our knowledge, has conclusively identified a specific learning disability syndrome. No one has to date described etiological factors and patterns of symptoms that make it possible to differentiate within this group of academically disabled children, those whose academic failure may be due to environmental experiences, from those whose academic failure may be due to heredity or neurological factors. This holds whether the abnormality is labeled specific dyslexia, congenital word-blindness, strephosymbolia, specific language disability or any of the other "fancy" terms used to describe children that have trouble learning in school.

Some thoughtful studies, however, are being made at present: for example: the study of early prediction of high risk learning disability children

by Katrina de Hirsch (1966) at Columbia-Presbyterian Medical Center in New York; the work on the disabled reader by Professor John Money (1966) at the Johns Hopkins University.

I now wish to introduce to you a study we are making in the Palo Alto Unified School District in California where there is a special remedial program for "educationally handicapped" pupils (hereafter referred to as EH). The major criteria for identification as educationally handicapped is a significant discrepancy between ability and school achievement (1.5 to 2 years retarded). More than 97% of the children selected for this remedial program have reading and spelling problems. Approximately 2% (or 300 out of 16,000) are selected for this remedial help; hence, the children represent a rather severely impaired group academically.

Purpose of the study

Our study has two major purposes:

1) to discover whether the characteristics of these academically handicapped children can be more precisely identified, described and labeled;
2) to further clarify the causes of learning disabilities.

We believe that such an analysis is necessary as a basis for the future development of specifically appropriate remedial measures.

The design consists first in comparing EH children, a) with their same sex siblings, and b) with matched same sex children who are academically successful, and their siblings. Second, in comparing the parents of the EH children with the parents of the Successful Academic children on a number of items. This design makes it possible to explore the familial aspects of the abnormality.

Subjects

The subjects are 304 elementary and junior high school children, of whom 244 are boys and 60 are girls. Table II describes the sample. There are 76 EH children, and their 76 same sex siblings (referred to as EH and EH sibs). The 76 EH children are matched on the basis of grade, sex, and intelligence (within 10 points on the WISC) with 76 children who are successful academically (referred to as SA and SA sibs), and their 76 same sex siblings. The two sets of siblings are matched for grade and sex.

We first screened the remedial population to locate EH students with same sex siblings in our school district. After obtaining written permission from the parents for their children to participate (and with the understanding that the parents, too, would be involved), the EH children were given individual mental tests to see whether they would meet the criterion of normal ability (a full scale IQ of 90 or above).

Once having selected an appropriate EH - EH sib pair, we proceeded to locate a successful academic child with an appropriate sibling to match the EH pair. A clerical assistant combed the school district rosters in order to locate several potential matches. For example, let us suppose that we were searching for a successful academic student in the 6th grade, IQ $\pm$ 10 points from 120, who also had a male sibling in the 3rd grade. After locating 5 or 6 possibilities, we sent out a simple rating form to the appropriate classroom teachers to obtain a teacher estimate of ability and academic performance. Previous test results available from school records were also considered. We then approached the families of children who appeared to be reasonable matches and, once having obtained parent cooperation, we proceeded to test the successful academic child to see whether or not he met our requirements. We tested 184 children in order to locate the 76 matched sets of EH and SA children included in the study. Of the 76 EH subjects, 64 were located from within the population of remedial children; 12 were recommended by school principals and guidance consultants.

The mean age of the experimental and control children is 10 years. The mean age of the sibling groups is 9 years, 8 months. The average age difference between the EH and EH sibs is 2 years, 9 months; between the SA and SA sibs it is 2 years and 10 months. There are no significant differences in the distribution of older and younger siblings between the experimental and control groups.

The ordinal position within the family is not significantly related to learning disability in the sample. This is important because a significant finding in relation ordinal position would clearly be a contraindication for considering genetic transmission of the abnormality. If, for example, an abnormality was genetically determined, then the children affected with the arnormality would be distributed randomly within the family.

Data obtained from parent interviews and school records indicate that our experimental and control groups do not differ significantly in social-economic background. Palo Alto is a university and scientific community with a primarily middle to upper-middle class population. Fig. 1 presents the educational levels of the fathers of the two groups. As you can see, these levels are practically identical. Furthermore, there are no differences between the groups on the occupational level of the fathers (Hollingshead 1958).

Procedures

The data collecting procedures employed in the study involved both individual interviews and evaluations with the children and their parents. All children in the study were given psychological and educational evaluations. A research assistant contacted the various schools and set up appointments. The psychologists, Dr. Adams and Mrs. Fisher, saw the children without knowing whether they were experimental or control subjects. The tests administered and the order of presentation are as follows: WISC, Bender, Draw-A-Person, and Wide Range Achievement Test. In addition, a brief child interview, and a rating of his behavior during the testing interviews were completed.

The research assistant also set up appointments for Dr. Forrest, the pediatric neurologist, who also examined the children without knowing whether they were experimental or control subjects. He assessed the EH, EH sibs, and the SA children medically and neurologically. Following the medical examinations, Dr. Forrest and one other physician interviewed the children's mothers to obtain family medical histories, and signed releases for the hospital birth records on the children.

Behavior ratings of the children were obtained in the following manner. A clerical worker was given a coded list of the participating children's names and schools. She was asked to go to the schools and to type information available in the cumulative records related to school adjustment and behavior. (In California there is a particular section of the cumulative record designated for this kind of information.) Code numbers were placed on the back of the cards. Thus, it was possible for three raters to work with these cards with no knowledge about the groups to which the children

were assigned to the study.

Two psychiatrists and two clinical psychologists (2 men and 2 women) interviewed separately the mothers and fathers of the children. These interviews were recorded on tape and have been transcribed. Straightforward information such as parent education and occupation has been taken from these interviews for this presentation. The more intensive ratings of these interviews represent a second phase of the project and will be reported later.

Parent Reading Scores and High School Records

I would, however, like to tell you about some interesting differences between the parents of the two groups of children.

At the end of the interview, we administered reading tests (WRAT) to both the mothers and fathers of the children and obtained releases from them in order to send for their high school records. We predicted that the fathers and mothers of our experimental children would perform more poorly on the reading tests and that their high school English grades would be significantly poorer than those of the control parents. These data are presented in Table III. The fathers of the successful academic children have the most superior reading scores; the mothers of the SA children are second highest. The fathers of the EH children are third and the mothers of the EH children obtained the lowest scores. The differences between the EH and SA fathers are significant ($t = 2.41$, $p < .02$). The differences between the mothers approach, but do not reach, significance.

The grades in English courses at the high school level also differentiate our parents. The SA children's parents were significantly better (fathers $t = 2.50$, $p < .02$; mothers $t = 2.33$, $p < .02$). In mathematics there were no significant differences between the fathers. The EH mothers, however, were significantly poorer than the SA mothers ($t = 1.81$, $p < .05$).

These reading tests and high school transcripts provide objective information relative to the academic performance of the two parent groups. There is little doubt that the parents of the EH children had academic problems in the language areas when they were in school.

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TABLE I

TWIN STUDIES OF LEARNING DISABILITY#

		MONOZYGOTIC (12)		DIZYGOTIC (33)	
	Total (pairs)	Concordance*	Discordance**	Concordance	Discordance
HALLGREN 1950	6	3	0	1	2
NORRIE 1954	28	7	0	6	15
NORRIE (UNPUBL)	11	2	0	4	5
TOTAL	45	12	0	11	22

*Concordance - both members of twin pair show abnormality

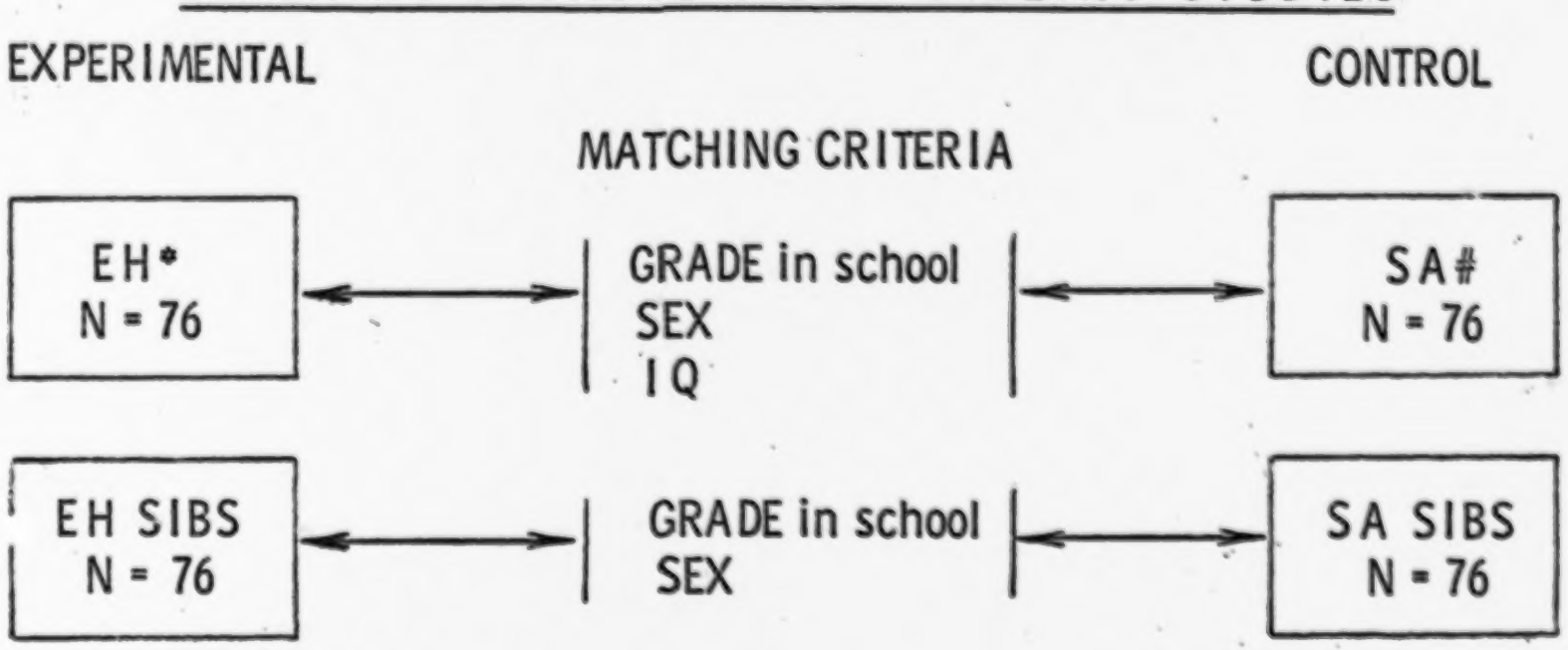
**Discordance - only one of twin pair shows abnormality

#Reported in Hermann, K. (1959)

TABLE II

Sample

LEARNING DISABILITIES - SIBLING STUDIES



PARENTS INTERVIEWED

EH MOTHERS
N = 75

EH FATHERS
N = 65

SA MOTHERS
N = 73

SA FATHERS
N = 64

*EDUCATIONALLY HANDICAPPED

#SUCCESSFUL ACADEMIC

TABLE III

PARENT READING TEST SCORES

WRAT

	EH	SA	Difference t	p
FATHERS	13.05	14.12	2.41	$<.02$
MOTHERS	12.87	13.44	1.38	n.s.

PARENT HIGH SCHOOL GRADES

ENGLISH

	EH	SA	Difference t	p
FATHERS	2.94 (C)	2.49(B-)	2.50	$<.02$
MOTHERS	2.44 (B-)	2.07(B)	2.33	$<.02$

MATHEMATICS

	EH	SA	Difference t	p
FATHERS	2.80 (C)	2.56 (C+)	1.35	n.s.
MOTHERS	2.64 (C+)	2.31 (B-)	1.81	$<.05$

Figure 1.

EDUCATIONAL LEVEL OF FATHERS